

REMARKS

Applicant respectfully requests further examination and reconsideration in view of the remarks set forth below. Claims 1-60 were previously pending in this application. In the Office Action, Claims 1-5, 7-9, 12, 17, 18, 20, 27, 32-34, 37-39, 45, and 58-60 are rejected, and Claims 6, 16, 19, 22-26, 28, 41, 44, 47-51, 53, 54, 56, and 57 have been withdrawn in accordance with the previously filed restriction requirement. Also within the Office Action, Claims 52 and 55 are allowed, and Claims 10, 11, 13-15, 21, 29-31, 35, 36, 40, 42, 43, and 46 are objected to and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. By the above amendments, Claims 1 and 27 are amended, and Claims 6, 16, 19, 22-26, 28, 41, 44, 47-51, 53, 54, 56, and 57 are canceled. Each of the rejections is fully addressed below. Accordingly, Claims 1-5, 7-9, 12, 17, 18, 20, 27, 32-34, 37-39, 45, 52, 55, and 58-60 are now pending in this application.

In the Specification

On page 10, lines 7 and 9, the program flow state 314 has been amended to state 310, and the program flow state 316 has been amended to state 312 due to typographical errors made in the original application. The corrected state numbers now accurately reflect those indicated in Figure 3.

On page 20, lines 17 and 19, the phrase "United Kingdom English" has been replaced with "United States English", due to typographical errors made in the original application. These corrections are made to conform with the state 604 in Figure 6.

On page 20, line 21, the phrase "United States English" has been replaced with "United Kingdom English", due to typographical error made in the original application. These corrections are made to conform with the state 606 in Figure 6.

Rejections under 35 U.S.C. § 102

Within the Office Action, Claims 1-5, 7-9, 12, 17, 18, 20, 32-34, 37-39, 45, and 58-60 stand rejected under 35 U.S.C. 102(e) as being unpatentable over U.S. Patent No. 6,185,535 issued to Hedin et al. (hereafter "Hedin"). The Applicant respectfully traverses this rejection.

The present invention is a system and method for speech recognition using an adaptive multi-pass technique. The system includes an input device coupled to a source of spoken input for receiving the spoken input. A processor coupled to the input device performs a first pass speech recognition technique on the spoken input and forms first pass results. The first pass results can include a number of alternative speech expressions, each having an assigned score representative of the certainty that the corresponding expression correctly matches the spoken input. In the preferred embodiment, scores for alternative expressions and differences between such scores are utilized to determine whether to perform another speech recognition pass.

Preferably, the first pass is performed by a simpler speech recognition technique which narrows the possibilities for expressions which match the spoken input, while the second pass is performed only when necessary and by a more complex speech recognition technique which operates on only the narrowed possibilities.

As an example using probabilities, assuming the spoken input is the word, "Boston", the results of the first pass could be a certainty of fifty-five percent (55%) assigned to the expression: "Austin"; a certainty of forty percent (45%) assigned to the alternative expression: "Boston". The processor selectively performs a second pass speech recognition technique on the spoken input according to the first pass results. Because in the example, the results of the first pass are insufficient to correctly identify the spoken input, a second pass speech recognition is performed. In the preferred embodiment, the second pass speech recognizing technique attempts to correctly match the spoken input to only those expressions which were identified during the first pass as likely candidates. In the example above, the second pass speech recognizing technique is performed on the expressions "Austin" and "Boston". Otherwise, if one of the expressions identified by the first pass is assigned a certainty that is higher than a predetermined threshold (e.g., 95%), a second pass is not performed.

In contrast, Hedin teaches a system for enabling low power terminals to access and control remote server applications via a voice controlled interface. A Terminal Part (TP) 203 and Terminal Application Part (TAP) 201 embody a client terminal (client part 101), which is coupled to a Remote Application Part (RAP) 205 (gateway/proxy part 107) via a first digital link 105, and the RAP 205 is coupled to a External Services and Content (ESC) 207 (server 109) via a second digital link 111. The TP 203 receives speech from a user. The input speech is provided to the TAP 201, where each word within the input speech is isolated (Hedin, col. 7, lines 7-11). Each "isolated word" is supplied to an automatic speech recognition system (ASR) 227 for isolated word recognition analysis (Hedin, col. 7, lines 14-16). The ASR 227 attempts to match the isolated word to one of a plurality of predetermined words stored in a local database, the TAP reference database 233. The TAP reference database 233 only includes a limited vocabulary, including standard WAP vocabulary and a predefined vocabulary that is terminal dependent (Hedin, col. 7, lines 20-23).

If the isolated word can not be recognized by the ASR 227, then the audio encoded data corresponding to the unrecognized isolated word is packaged and sent to the RAP 205, which includes another ASR 307. In order to pass the unrecognized isolated word on to the RAP 205, the audio encoded data from the start/stop detector and recording unit 225 is formatted as MIME types by a MIME formatting unit 247 in the TAP 201 (Hedin, col. 8, lines 30-33). The ASR 307 then attempts to recognize the audio encoded word that was not recognized in the TAP 201, that is, words that were transferred to the RAP 205 as MIME types (Hedin, col. 9, lines 12-16). In summary, Hedin teaches a first ASR that determines if a received spoken word is a match or is not a match to a limited vocabulary. Hedin does not teach that when there is not a match that one or more "possible matches" are made, e.g. first pass results, and that these possible matches are forwarded to the second ASR, where the second ASR attempts to recognize the possible matches (first pass results). Instead, Hedin teaches that the audio encoded data corresponding to an unrecognized word is sent to the second ASR. The audio encoded data is the actual audio representation of the originally spoken word. The audio spoken data is not a possible recognized match output by the first ASR.

The amended independent Claim 1 includes a speech recognition system for recognizing spoken input received from a source of the spoken input coupled to the speech recognition system. The speech recognition system comprises input means for receiving the spoken input from the source of the spoken input, and processing means coupled to the input means for performing a first pass speech recognition technique on the spoken input and for forming first pass results, wherein the first pass results define one or more preliminary matching speech expressions, further wherein the processing means selectively performs a second pass speech recognition technique on the spoken input according to the first pass results. As described above, Hedin does not teach that one or more possible matches are made by a first ASR, and that these possible matches are forwarded to a second ASR. For at least these reasons, the independent Claim 1 is allowable over of Hedin.

Similarly, the amended independent Claim 27 includes a method of recognizing spoken input received from a source of the spoken input. The method comprises receiving the spoken input from the source of the spoken input, performing a first pass speech recognition technique on the spoken input, forming first pass results, wherein the first pass results define one or more preliminary matching speech expressions, and selectively performing a second pass speech recognition technique on the spoken input according to the first pass results. As described above, Hedin does not teach that one or more possible matches are made by a first ASR, and that these possible matches are forwarded to a second ASR. For at least these reasons, the independent Claim 27 is allowable over of Hedin.

Claims 2-5, 7-9, 12, 17, 18, and 20 are each dependent upon the independent Claim 1. Claims 32-34, 37-39, and 45 are each dependent upon the independent Claim 27. As discussed above, Claims 1 and 27 are each allowable over the teachings of Hedin. Accordingly, Claims 2-5, 7-9, 12, 17, 18, 20, 32-34, 37-39, and 45 are each also allowable as being dependent upon allowable base claims.

Hedin teaches that an isolated word is passed to the first ASR 227. The ASR 227 includes a feature vector extraction unit 229 which receives the isolated word and maps it into a vector space that is suitable for use by a feature matching and decision unit 231 (Hedin, col. 7,

lines 16-20; Figure 2). The feature matching and decision unit 231 compares the feature vector supplied at the output of the feature vector extraction unit 229 with feature vectors supplied by the TAP reference database 233 (Hedin, col. 7, lines 33-36). There is no hint, teaching, or suggestion within Hedin to indicate that the ASR 227 performs a speech recognition technique based upon a result of a speech recognition technique performed on prior spoken input. The ASR 227 performs the same speech recognition result for all input speech.

The independent Claim 58 includes a method of recognizing spoken input received from a source of the spoken input. The method comprises receiving the spoken input from the source of the spoken input, selectively performing a first pass speech recognition technique on the spoken input based upon a result of a speech recognition technique performed on prior spoken input from the source, and performing a second pass speech recognition technique on the spoken input. As discussed above, Hedin teaches a single speech recognition technique, which can not be modified and is not based on the speech recognition results from a prior spoken input. For at least these reasons, the independent Claim 58 is allowable over of Hedin.

The independent Claim 59 includes a method of recognizing spoken input received from a source of the spoken input. The method comprises receiving the spoken input from the source of the spoken input, selectively performing a first pass speech recognition technique on the spoken input based upon information obtained regarding a speaker of the spoken input, and performing a second pass speech recognition technique on the spoken input. As discussed above, Hedin teaches a single speech recognition technique, which can not be modified and is not based on the speech recognition results from a prior spoken input. For at least these reasons, the independent Claim 59 is allowable over of Hedin.

The independent Claim 60 includes a method of recognizing spoken input received from a source of the spoken input. The method comprises receiving the spoken input from the source of the spoken input, selectively modifying a first pass speech recognition technique to be performed on the spoken input based upon a result of a speech recognition technique performed on prior spoken input from the source, and performing the first pass speech recognition technique on the spoken input. As discussed above, Hedin teaches a single speech recognition

technique, which can not be modified and is not based on the speech recognition results from a prior spoken input. For at least these reasons, the independent Claim 60 is allowable over of Hedin.

Within the Office Action, the independent Claims 52 and 55 are allowed.

For the reasons given above, the Applicant respectfully submits that all of the claims are now in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, he is encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Direct Deposit Account No. 18-1275 for any matter in connection with this response, including any fee for extension, which may be required.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR § 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

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Date: 1-26-04 By: John D. Smith